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Reaching Through Teaching

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Contributions from faculty are solicited. Please submit articles to CETL on a 3.5" disk in Word, or via e-mail (dforrest@ksu.mail.kennesaw.edu). Preferred length of articles is 750-1800 words. Deadline for the next issue is March, 1999.

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The Best of Times, The Worst Of Times

Donald W. Forrester, Editor, Director of the Center for Excellence in Teaching and Learning, Kennesaw State University

Never in the history of higher education have faculty and students faced so much change. Not even the invention of the printing press brought about the level of promise, perplexity, opportunity, and threat that we have experienced in the last half-century, and especially now. There are several reasons that may explain why this is so. Also, no doubt, the reader can offer other explanations; but bear in mind that the writer's purpose is to raise questions—not provide answers.

The first cause of change is obvious: two generations of learners have grown up in front of the television set, where stimuli have been both verbal and visual, not to mention entertaining. Are we not challenged even to hold the attention of such learners?

Second, we are experiencing tremendous demographic change. Not only are exploding numbers of people choosing to avail themselves of college education, the academy now includes older students, many more women, and a much more diverse racial, ethnic, and socioeconomic mixture.

Third (and perhaps a function of the changing demographics mentioned above), students' reasons for attending college are often quite different from those of their counterparts from a few generations ago. Whereas past generations may have thought of the university as a kind of finishing school for the sons of the wealthy, higher education is now also sought after by upwardly mobile men and women seeking to boost their careers. They enroll in college looking for a high quality learning experience that will prepare them to earn a better living as well as prepare them for a higher quality of life. In short, they are extremely consumer-oriented.

Along with the expectation that college will prepare them professionally, today's students insist that technology be a part of their educational package. Paradoxically, though, they often feel threatened when the computer is part of their educational package. Also, their exposure to technology is anything but consistent, since faculty acceptance of this new teaching aid ranges from total rejection to blind acceptance of anything that is high tech.

The next change agent is, quite frankly, the academy's competition. Corporate training—the in-house university—and the for-profit universities are making increasing inroads into once-sacred higher education territory. Add the emerging on-line degree programs and the university faces, for the first time in history, genuine competition from those who are willing to meet the immediate needs and wants of students.

What is to be made of all this? Clearly we face both great opportunity and great threat. If Tale of Two Cities had been written in the 1990's, perhaps Charles Dickins' opening line would have been (perish the thought!), "There was good news and there was bad news." With this unsettling thought in mind, ponder the following observations:

The Good News

More and more students attend college with an unprecedented seriousness of purpose. They really want to learn.

We have an amazing new technology at our fingertips.

A college education is in reach of many who were once denied the opportunity.

We have the opportunity to redefine what a college education should be.

We have the opportunity to redefine what good, effective teaching is and to explore new presentation modes.

The artificial boundaries separating teaching, scholarship, and service are disappearing.

Teaching is regaining its proper level of respect as the university's most important mission.

Academe's competition is forcing us to reconsider our product and mission. This needs to be done and is healthy.

The Bad News

Students' ideas of college curriculum are often at odds with what the faculty thinks is important, and their motivation to learn may not be for the right reasons.

Some faculty and students are threatened by computer technology. Information on the Web is not evaluated as to quality; the efficacy of computer-assisted learning is still unproven; and many faculty actually fear for their jobs.

Higher enrollments often mean larger class size.

Redefining the meaning of a college education is hard work, the most difficult part of which will be reaching consensus.

Traditions die hard. Some will never see teaching as anything but "telling" or learning as anything but "mimicking."

Traditions die hard. Some will never see the potential for merging teaching, scholarship, and service.

Some will die believing that teaching is the "weak sister" when compared to research.

Some universities will become market driven, forgetting their unique mission.

In light of what has been said, maybe you feel pessimistic about higher education's prospects, and perhaps, fearful about your own future. Let me try to provide some reassurance. There will always be a place for dedicated, caring, effective college teachers. While computer assisted learning intrigues students, they also have demonstrated that they need and want the human touch.

There will always be a university. Students need and want a learning community where they interact with professors and peers and learn from one another. The American professorate at traditional colleges and universities is the best prepared in the world. For-profit and corporate teaching institutions will be hard pressed to match our faculty expertise. Our challenge to improve is an exciting opportunity.

Further, most colleges and universities have solid and well-thought-out curricula. We do not need to scrap the curricula, but rather to show how the traditional arts, sciences, humanities and social sciences, and the array of professional courses address and enhance our students' personal and professional lives. And yes, technology can and must be infused into all the curriculum, traditional and non-traditional.

Let us take further comfort in the fact that teaching is a skill that can be improved. Even the lecture method—arguably the least effective teaching medium—can be improved. Let us realize, however, that there is so much more. While there is no one methodology that suits every instructor, nor every subject, nor every occasion, there is a veritable arsenal available to the resourceful professor.

Let us also recognize that learning is a skill that can be improved. It is imperative that, as part of our teaching, we help our students improve that skill. We do so by first knowing and honoring the many ways people learn (some very different from our own), by teaching students to be more responsible for their own learning, and by creating the awareness that learning is a never-ending, life-long process.

Reaching Through Teaching has never claimed to provide either quick and easy teaching methodologies or pat teaching philosophies. It is, rather a forum for conscientious, intellectually curious, entrepreneurial professors to share their successes (and even failures) and to learn from one another. If this interests you, read on.

Student-Driven Knowledge & Experience Creation: A Theatrical Lesson for Higher Education in the Next Millennium

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"Learning: The Old Paradigm: ... Teachers, by virtue of their own success in the learning system, have come to know what should be known, and so, define the learning tasks. Education is production. Teachers give assignments to students. Error by students is discouraged, detected and corrected; the less error by the student, the more learning taken place, and in the limiting case, no error means that maximum learning has occurred."

"Learning: The New Paradigm:...Education is mutual exploration. Teachers write and talk as impetus, creating an environment in which learning can take place. Error is encouraged as the mechanism by which knowledge is generated; in the limiting case, large error may take the learner far from the current equilibrium to higher order of understanding." — Col. Chuck Yoos, USAF (1995)

An introspective analysis of the direction of higher education is not new. Indeed, there has been extensive debate in the academic arena regarding how best to stimulate, guide, and perpetuate the learning process. While the narrative of higher education has substantially evolved over the past one-hundred or so years, the most recent third of this period (the last 30 years) has experienced more revolutionary attempts to modify curriculum and pedagogical approaches. As we approach the milestone of the millennium, it therefore seems appropriate to re-examine alternative perspectives of dynamics of learning.

It may be argued that many involved in systems of higher education adhere to a particular view of students as "works-in-progress" who are eventually molded into what the University deems finished, quality-controlled, and ultimately salable products. Since, from this perspective, students are little more than raw material or assemblages, decisions regarding curriculum content or requisite learning must be developed by the factory managers or administrators. In a system and vision of this sort, there is a little room for the eventual "products" to participate in the design of the production process. Consider a statement by Herbert Hoover in 1957 as a means to sum up this perspective: "you simply can not expect kids of those ages to determine the sort of education they need unless they have some guidance." (Time 1957). Guidance regarding curriculum is certainly important, and is of course a reasonable expectation of the university mandate/objective as a whole. However, it may be that this manufactory perspective, compounded by the mass-production concept dictates of scale economies (larger and larger masses of students with little opportunity for individual attention or assessment) has led to what might be understood as the McDonaldization (Ritzer, 1993) of education. This mold-making and mold-filling approach to curriculum development and delivery has no doubt potentially impeded the growth of creativity and innovation in the learning process.

In order to then augment and rejuvenate this sterilized content and delivery strategy, traditional teaching methods have been expanded to include cases, videos, simulations, or other representations of the "real world". While these

tools do enrich, illustrate, and authenticate the applicability and viability of the provided theories, they perpetuate an institutional "hyper-reality"–simulations derived from simulations which are assumed to represent and provide grounding in reality–(Baudrillard, 1983). Like the droves of tourists who visit the IMAX theater next to the Grand Canyon to see it on film in order "to really experience it" (Firat and Venkatesh, 1995), students' passively consume hyper-real representation of discipline-centered experiences as they are delivered in the classroom. It is important to note that in this perpetuation of conventional pedagogy, the danger of educational entropy is nearly inescapable. That is, the inheritance of teaching methodologies from one generation to the next imparts not only the potential for a loss of meaning, but the loss of grounding in reality also may demotivate the teacher as well as the student to create and innovate.

More recent discussions have contemplated the education process from the marketing perspective (i.e., the student as the customer--see Bagley and Foxman, 1996). The positive side to this approach is that the students' needs are met by adapting (some might argue "compromising") curriculum to meet their career or life aspirations. Although this Burger King paradigm of customer choice ("have it your way") has its merits and has provoked a reconceptualization of teaching, it still emphasizes the extreme separation of knowledge production (the domain of the teacher/researcher) from that of knowledge consumption (the domain of the student). Hence, students remain as passive recipients of this "knowledge" rather than active participants in its creation and discovery.

From a third, and again differing perspective, the optimal learning process takes place under conditions in which the teacher both perceives and engages students as providers as well as receivers of knowledge. Under this perspective, active learning can be seen as essentially a problem solving activity, whereby the skills of creativity, innovation, and independent thought can and should be seen as yielding advantage. The mastering of these skills requires the student to retain knowledge for a long, if not infinite, period of time (and at the very least, well beyond the expected life of material memorized for an exam or over the course of a semester).

Addressing the role of the student as an active participant in the creation of knowledge is an essential element of this alternative perspective. As such, teachers cease to be merely the suppliers of a hyper-reality knowledge product designed around perceived and interpreted student needs. Rather, teachers provide the necessary resources (both tangible and intangible) and situations/environment to enable students to construct their own learning "products" (knowledge, experiences, understanding).

The goal of this approach is to strike a balance between student self-determination and university parenting by engaging all parties in the process of knowledge production. Thus, the teacher plays a tri-partite role as a facilitator, a resource-finder, and as a sounding-board or reality-check. Students, on the other hand, become active participants in the knowledge-creation process. Additionally, assuming that the teacher does not "know it all," he/she can also be a benefactor of discovery in this process, as a result of students' production of knowledge. In this process, each student sets out to acquire knowledge guided by his/her benchmark interpretation of reality, as well as via direction from the teacher/facilitator. By pursuing different avenues of discovery and living up to the responsibility to find and acquire the information and knowledge that will benefit the entire class, the end result is not only one of both production and consumption of a unique educational product/experience, but also the broadening of the pool of information available to every student. In addition, the sum total of information presented to each student is interpreted (consumed) in a manner that is a direct result of his/her experiences and interests. The goal is thus an experience that affords each student the opportunity to take part in a unique and self-directed educational process.

The idea of a class in which each student is allowed to undergo a unique educational transformation can be compared to the play, *Tamara*. Most plays, like many classes, provide a "mass-market" experience in which all members of the audience sit passively and receive a linearly-distributed pattern of enlightenment. As Boje notes (See Boje, 1995 and Boje & Dennehy, 1993), *Tamara*–one of the longest-running plays in Los Angels–provides the ultimate metaphor for active production/consumption and experience because it allows members of the audience to wander through rooms of a mansion at their own discretion and in the order of their own choosing. In each of these rooms, the audience member encounters actors engaged in various situations, dramatizing various sub-plots of the play. Actors come and go from each room in order to interact with one another in brief scenes. Although there are a number of actors in each room simultaneously, and while the interactions between these actors follow an overall script, the simultaneity of interactions and the fact that audience members choose their own sequence of rooms means that every person produces and consumes a unique entertainment experience.

Tamara, like participation in the real world, unfolds in a variety of realities, experiences, and understandings simultaneously. A single, linear interpretation of these realities, no matter how comprehensive or insightful, cannot adequately explain or relate the multiplicity of this process. The vision of active education or learning, then, is to break up the meta-narrative (Lyotard, 1984) or one-dimensional interpretation of reality provided by traditional educational approaches, and replace this with local interpretations of the real world. *Tamara* is also relevant to education in that it engages the audience-member/student as an active participant in the delivery of the experience, rather than encouraging passive or voyeuristic learning.

In a time of global competitiveness when innovation is a key to success, the facilitators of higher learning must heed the call to graduate creative and motivated individu-

als. Innovative and reality based pedagogical approaches that are driven by the opportunity for students to create knowledge and experiences in a synergistic learning environment just may be the key to providing a progressive and useful education in the next millennium.

Using Curriculum to Connect Psychology Students and Careers

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Melissa Chatham, Psychology Major, Kennesaw State University

Faculty Perspective

I wish I had a dollar for each time a student said to me, "I really love psychology, but I know I can't do anything with a psyc degree." If I had another dollar for all the jokes I've heard about what you can or can't do with a psychology degree, I'd be very rich by now. Unfortunately, psychology, like many Liberal Arts degree programs, is often seen as an interesting field of study but not a very "useful" degree in today's society. Certainly the value of liberal arts education has been touted by many people and goes well beyond the scope of this article (e.g., Hersh, 1997; Ridley & Gallaer, 1993). My purpose here is not to address this general issue, but to share with you the story of how our department responded to this paradox for our students. Hopefully our success story will help those of you in disciplines facing similar issues respond to your students' questions.

When our department developed and implemented an assessment plan several years ago, we elected to use senior exit surveys and alumni surveys as part of our methodology. It didn't take us long to realize that our graduating seniors and alumni felt there were many things we were doing very well. That was the good news! For example, our graduates believed our program prepared them quite well for graduate study (Bickes, Lawrence & Noble, 1997). These students were clearly seeing the connection between the skills and knowledge acquired in their undergraduate degree and success in their graduate work. However, only 14% of our students were going on to graduate school. The rest (actually most) of our graduates were going directly to work with their undergraduate degree. This finding was very consistent with natural trends in the discipline (McGovern & Carr, 1989). Our bachelor-level students were in a variety of different jobs and careers, ranging from social service agencies to business. For this group, the relevance of their courses for job preparation was not so apparent (Bickes et al., 1997). The issue for our department then was to find ways to help our students see the value of their psychology degree for career options that did not require graduate study. Our ultimate goal was to address this need without reducing the quality of the program for graduate school preparation. Although we have implemented a number of ways to accomplish this (see our web page at www.kennesaw.edu/psychology/), one of the more innovative approaches we adopted was to require a one-credit-hour course called Careers in Psychology. We modeled our course after a handful of similar courses offered across the country (e.g., Georgia Southern University, Northern Kentucky University) that have demonstrated success. For example, a recent assessment of the course at Georgia Southern found a significant increase in clarity of career goals for their majors (Kennedy & Lloyd, 1998). I am teaching the first section of our new course this semester and have found the experience very rewarding. The course focuses on career planning and development issues for our majors. Using a variety of instructional methodologies we expose students to a wealth of information designed to assist them in clarifying, selecting, and pursuing a career in psychology or a related field. Students this semester are engaged in several active learning projects that are designed to encourage them to consider seriously the relationship of their major program of study and their career goals.

Student Perspective

When I first decided to become a psychology student, I thought majoring in psychology invariably meant two things: going to graduate school and becoming a psychotherapist. Despite my sincere passion for and fascination with psychology, I initially entered the major rather reluctantly and faithlessly. I responded to people's sometimes patronizing inquiries about my decision to major in psychology by saying that I stumbled into it somewhat by accident and default.

Of course, to echo an old adage, how much I wish I had known then what I know now. After enrolling in Careers in Psychology, I now realize with much confidence and conviction the vast array of opportunities available to those with either an undergraduate or graduate degree in Psychology.

The resources and information offered to students taking the course dismantle the myths of uselessness and limitation so often associated with a psychology degree. Internet exercises, alumni interviews, text readings, guest speakers, in particular alumni and representatives from the CAPS and Career Services Center, have provided tangible and practical insight regarding not simply the multi-faceted utility of a psychology degree but even more so, the degree's many advantages.

In response to this insight, I have found myself ebulliently repeating nearly everything that I have learned through the course to those I encounter. Clearly, the class activities have broadened and deepened my knowledge and understanding of the unique benefits, skills, and experience that a psychology degree offers, not only to aspiring graduate students but also to those seeking a career immediately following undergraduate school.

I truly believe that Careers in Psychology is a vital and wise addition to the course curriculum. No doubt it will aid prospective psychology students in identifying how they can successfully apply and expand their interests to develop a fruitful and satisfying career. In fact, I think it's safe to say that every degree program, especially those included within the broad discipline of Liberal Arts, would inevitably improve each of their programs with the addition of a similar course.

IQI: A Strategy for Facilitating Reading and Discussion in the University Classroom

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Instructor's Perspective

University students and faculty often struggle from two different sides of curricular issues. For example, instructors struggle to find ways to encourage students to read and discuss information from textbooks. Students, on the other hand, often require incentives to read textbooks and to contribute to class discussions. A teaching tactic that I call an IQI addresses both these concerns. This acronym stands for an Interesting Point, a Question to Ponder, and an Important Issue to Discuss. The intent of this activity is to encourage active interaction with the textbook and among classmates.

I initiate the IQI early in the term, especially in classes with 30 to 50 students that include textbook materials that students are expected to read. I explain to students that they will be assigned to a chapter in the textbook and that they are expected to read the chapter and to note interesting items, important issues to discuss, or note any questions that they want to address in class. An alternative to assigning students alphabetically to chapters is to have students sign up for chapters depending on their schedules and areas of interest. Depending on the number of students in the class and the number of chapters in the textbook, three or four students are assigned to each chapter. They can then prepare their IQI items according to the established class calendar. Then, prior to addressing textbook material in class, I call on those students assigned to the chapter to lead discussion using their IQI issues. I include the students' contributions to the IQI as a part of the class participation component of the final grade.

The assignment of an IQI does not guarantee that students read all the chapters in their textbooks, but it does encourage them to read their assigned chapters and to prepare items to discuss. Some students are always more verbal than others and can monopolized class time, unless structures are in place to control discussion time. Other students will remain reticent, unless prodded to participate orally in class. However, with an IQI assignment all students must contribute to classroom discussion at least once during the term. Another benefit is that the IQI is an open-ended task that allows students to address topics and concerns from their individual perspectives.

Perhaps the greatest value of the IQI is that it allows me to gain insight about my students. From what they address in their IQI's I can be constantly updated on students' perspectives. Instead of my determining what is important or interesting about the text, the students indicate by their selections what they deem worthy of class discussion. Thus, the IQI helps to maintain and value the students' perspectives on what is read and addressed in class. After several students have brought up their items for discussion, I can add my comments and clarifications, and address anything else that I consider important for students to be aware of in the text. For example, I can mention elements that might be included on course examinations.

I have found the use of the IQI technique to be productive for my students and me. I appreciate hearing their views on the assigned material and welcome the directions that their IQI's have led classroom discussions. Many students have, likewise, expressed appreciation for the technique. This supports my intent to continue to use the IQI in my courses.

Student Perspective

I am a junior, enrolled in a Children's Literature course with Dr. Kathleen Mohr. On the first day of class, Dr. Mohr did the typical first day of class stuff. She explained the course, the expectations, went over the syllabus, and read a few children's books. The course appeared to be similar to any other course: some reading assignments, projects, and a final exam with some weight being given to attendance and participation. I falsely assumed the attendance and participation points would be "freebies" provided you show up for class most of the time. In actually, this

portion of the grade would be dependent on actual participation in class, coming to class, and completing an assigned IQI, (Interesting Point, Question to Ponder, or Important Issue). Basically, each student would be assigned to do an IQI for one chapter out of the textbook, as a way to monitor reading and begin discussions.

I was one of the three students assigned an IQI for chapter one. This assignment seemed easy enough. I read through the chapter, making notes as usual. After I finished, I looked back at what I had written down, and tried to think of what Interesting Point was made by the author, what Question I had about the content of the chapter, and what Important Issue the author brings up. Many ideas came to mind. I chose one of each, and marked them so I would be ready to bring them up in class.

I returned to class ready to share my IQI, but not expecting much discussion or class input. Another student shared hers first. Dr. Mohr spoke very little, mostly to facilitate the discussion. The students contributed to the first student's IQI, and added their own perceptions, understandings, and questions. As the discussion started to die down, I shared my IQI with the class. The same thing happened. The third student shared her IQI. She took the IQI assignment in a unique and interesting direction. She had, completely on her own initiative, created a questionnaire to go along with her IQI. Dr. Mohr happily handed the "stage" over to her, and allowed her, and the class, to learn more about the text through the worksheet/activity task she had prepared. Finally, Dr. Mohr concluded the discussion by pointing out additional items and answering any remaining questions.

We have now done this process multiple times. Each student brings his/her own knowledge and unique personality to the class through his/her own IQI, as well as responding to those of others. As a result, I think more students are reading the textbook, and thinking about the content. I have been in many classes where students, including myself, did not read the textbook and did fine in the class. In a college classroom, especially with many students, only a select few will contribute to any given discussion. In my opinion, I learn less in these classes, and ultimately, gain little from them. IQI's have been a way to allow varied comments generated by every student at least once.

As a student, I would like to see the IQI method used more often, especially in classes where the textbook is a major source of information. It is nice to hear opinions of all the students rather than just the professor and a few students. The IQI's have made me think about things differently than when I just read the text. I would like to take this opportunity to encourage other professors to implement IQI's and modify it for their own courses.

Teaching Mathematics from a Chemist's Viewpoint*

Ronald A. DeLorenzo, Professor of Chemistry, Middle Georgia College

Introduction

To better appreciate the approaches to teaching math discussed here, it's important to know that I am not a mathematician by profession. I have no special training or academic degrees in math, but my formal education (physical chemistry, Ph.D.) does require a math background. I have been teaching chemistry for about twenty-five years. Three years ago, I was asked to teach Calculus III. Because of my background as a scientist, i.e., as a practitioner of math rather than as a mathematician, my approaches are somewhat different than those of most math instructors.

Main Goals of the Educational Process

Waterman (1980) and DeLorenzo (1981) state that the main goals of the educational process are to teach students to: (1) communicate clearly, (2) study regularly, (3) master basic math skills, and (4) think logically. The acquisition of these four fundamental skills is more important than the subject matter. In fact, one might profess that the subject matter of many courses serves primarily as a vehicle for the mastering of the four fundamental skills.

For many generations, we as educators have been trying to insure our species' survival by requiring each new generation to hone various fundamental skills in as many different areas as possible. We firmly believe that this approach will equip future generations with the ability to solve unforeseen problems. We understand that although the majority of specific information will be forgotten, become obsolete, or simply never be used, the basic skills developed in the process will be retained. (Employers are also looking for students who have minds with these capabilities.) In this article, I will show how I attempt to develop in my students communication skills, regular study habits, a basic math proficiency, and a talent for logical thinking.

Communication

Cipra (1988) reports that David Smith of Duke University lowers one-fourth of his calculus students' grades by one letter because of their writing. Smith tells his students that if they don't write well as professionals, they will lose more than just letter grades. Stacy (1978) revealed that the official view of the American Chemical Society is that the ability to communicate is as important as the knowledge of chem-

istry. Accordingly, the American Chemical Society recommends that instructors make writing skills (sentence structure, spelling, punctuation, and style) a significant part of examinations. Paradis (1983) reinforces the need to develop writing skills with an MIT study showing that about 30% of all industrial professional activities involve writing. If students can't explain material in complete grammatically correct sentences, their mastery of the material is incomplete. Thurman (1988) states, "The fact is, of course, that the abilities to read carefully, to think analytically, to abstract generalizations from a mass of particulars and to communicate with both economy and precision have always been marketable skills" (p. 7A).

I try to develop communication skills in part by incorporating essay questions on all one-hour examinations and on about one-third of the daily quizzes. The essay questions are worth 35% of the one-hour tests. My essay questions are usually one of two types: (1) Write a paragraph explaining how to solve a problem, and (2) Write a paragraph explaining how to derive a formula. An example of the first type of essay question is, "Given the parametric equations x(t), y(t), and z(t) describing the Cartesian coordinates of a particle, write a paragraph explaining how the curvature of the particle's path can be derived." An example of the second type of essay question is, "Given the coordinates of the point P on line L and the equation of a vector parallel to line L, write a paragraph explaining how the equation of line L can be determined."

Student communication skills can be further sharpened when students recognize the importance of and master the use of significant digits and units. The number of significant digits in an answer communicates information concerning the number of significant digits in the original data. Multiplying 4 cm by 4 cm doesn't yield 16 cm2 because such an answer incorrectly communicates that the original measurements were made to two significant digits (i.e., 4.0 cm). (The correct answer would be 2 x 101 cm2 which, in lay language, is verbally expressed as, "about 20 cm2". We round to one significant digit.) The units associated with numbers communicate additional meaning. Not only are answers such as 16 cm2 incomplete and less clear without the unit cm2, all numbers written during calculations are similarly incomplete. In my chemistry classes, I go as far as requiring that even the numbers used in calculations include nouns and verbs, e.g.,

(10.0 grams salt form)(27.0 grams HCl react/9.00 grams salt form) = 30.0 grams HCl react as opposed to the more typical calculation (10 g)(27 g/9.0 g) = 30 g, which doesn't communicate as much information as the former and which also contains the incorrect number of significant digits.

The use of units can also provide additional insight for students. For example, consider what happens if we take the cross product of two vectors whose lengths are measured in centimeters. The i, j, and k components of these two vectors would also have to have the units of centimeters. This leads to an interesting result: the cross product of two vectors, whose components are measured in cm, produces a third vector orthogonal to the first two but with the strange units of cm2 and with a magnitude of length also measured in cm2. By asking my students how this can be, I am hoping to both stimulate their thinking and to lead them to a better understanding of the material being discussed. Since the majority of my students will be engineers, i.e., practitioners of mathematics, it is essential for them to be aware of these concepts.

Regular Study

I try to develop regular study habits in part by giving daily quizzes which count 30% of the final grades. When I began teaching, I knew of other teachers who gave daily quizzes, but I resisted the idea as "high schoolish" for many years. It was sobering for me to later learn that some students were bright enough to confine their studying to cram sessions before exams and still do well. I now tell my students that I wouldn't want a medical doctor who learned all of his knowledge of medicine in a one-evening cram session. Knowledge is best learned and retained by being absorbed in small chunks over an extended period of time.

Daily quizzes are less troublesome for instructors than you might think. Daily quizzes can be easy to grade (students must circle their answers, and the given grade can be 1 or 0). Daily quizzes can be easy to record (collect quizzes alphabetically, and record correct quiz grades with slashes / / / / in the grade book). Daily quizzes can be easy to administer (use transparencies to project quizzes onto a screen with students providing their own paper). To emphasize to my students my strong belief in the importance of daily study, I tell them that I will give them the benefit of the doubt for final grades that are on the borderline between two letter grades if the quiz grades are good. No such benefit of the doubt is given to students who consistently do poorly on daily quizzes.

Basic Math Skills

I try to develop basic math skills in part by developing both estimation skills and scientific calculator and computer proficiency. Examples of estimation skills that should be mastered include performing calculations such as 398 ft x 2076 ft = 8x105 ft^2 (by converting to exponential notation with one significant digit), and determining that sin(1) = 0.8 (by sketching).

Because so many students take to using calculators like fish take to water, it is all the more important that these students know how to estimate answers if for no other reason than to efficiently check their work by arriving at answers through two different routes. Much verification in science is based upon solutions arrived at through mutually independent approaches. For example, the exact amount of water is determined by weighing the sample (e.g., 5.00 grams) and measuring its volume (e.g., 5.00 mL). Likewise, the date of the universe is based on abundances of isotopes, the evolution of the oldest galactic stars, and the Hubble relation between the velocities of galaxies and their distances from us. In like spirit, students need to be able to

obtain answers by both estimation and by electronic computational devices to help ensure correctness and a feeling of confidence.

There has been much debate as to allowing students the use of calculators in calculus courses. Cipra (1988) reports that some math educators believe that the more computer power students have, the less students know what they're doing. Others believe that we are doing a disservice to students by not allowing them to make use of the current computational devices which would allow them more time to concentrate on the subject material.

I believe that there is a middle ground. My school, Middle Georgia College, is somewhat unusual among two-year colleges: our Math Department has ordered enough HP 28S calculators so that there is at least one available for each pair of students in Calculus III. I teach my Calculus III students how to use the Hewlett Packard HP 28S calculator to perform course-related calculations, but I do so primarily for their future reference. I disallow the use of electronic computational devices on exams. This approach is not inconsistent with my views that students need to be able to use computational devices and to be able to estimate to check their calculator answers. Let me explain. Once students observe the ease, power, and speed of computational devices, they naturally drift toward their use. On the other hand, estimation skills require time and effort, and mastering them is met with resistance. When students are told that they can use a calculator but they must also check their answers with mental estimation, the vast majority simply use their calculators and fudge estimated answers to resemble their calculator answers. By forcing students to rely solely on estimation skills during examinations, these students slowly, painfully, and begrudgingly develop these more important skills. Once students have mastered estimation skills, they begin to call upon these skills with increasing frequency.

Timnick (1982) discusses national studies which show that even the brightest students have blind faith even in machines deliberately designed to give incorrect answers. I (DeLorenzo, 1987) had a similar experience when I once gave a fast-food cashier a $10 bill for an order that came to $2 plus sales tax. I knew (estimated) that my change would be around $8 and was surprised to receive $1.55 in change. When I mentioned this discrepancy to the cashier, the cashier calmly said, "I'm sorry, sir, but the machine says that your change is $1.55."

Logical Thinking

I try to develop communication skill in part by implementing some of the aforementioned basic educational goals related to communication. For example, when students express themselves with grammatically correct paragraphs, they undergo thought processes quite different from those that they experience when they travel through more conventional mathematical channels of thought.

Additional student thinking can be stimulated by asking students simple questions such as the following:

A pre-solution question: When students are presented with problems, a simple question that can be asked is, "Does the problem make sense?" For example, given vector A = 2i+3j+4k, vector B = 3i+5j+2k, and vector C = i+7j+6k, is it possible to determine A x (B•C)? Such an operation cannot be done because vectors cannot be crossed with scalars. Likewise, a 3 x 4 matrix cannot be multiplied by a 5 x 3 matrix. Occasionally, on quizzes and on examinations, I ask questions that are impossible to answer.

A second pre-solution question: Students can also be taught logical thinking in terms of developing successful strategies for taking examinations. For example, if students are asked to find the determinant of a 6 x 6 matrix, students should realize that solving such problems takes an excessive amount of examination time and makes it difficult to solve the remaining questions in the fifty-minute examination. Perhaps there is a shortcut? Does the matrix contain two identical rows or two identical columns? Was the value of the transpose of this matrix given in an earlier problem?

A post-solution question: Additional student thinking can be stimulated by asking students simple questions such as, "What does this answer mean?" For example, after finding the magnitude of dT/ds=aw2/(a2w2+b2) for a vector valued function F(t), most students are overwhelmed by the apparently meaningless mix of letters in the solution and don't think what the solution conveys, i.e., that the curvature is independent of time and is in fact a constant. After drawing this out of them, I follow with the question, "What kind of curve has a constant curvature that is independent of time?"

A second post-solution question: Another simple question that can be asked after solving problems is, "Does this answer make sense?" For example, when finding the unit normal vector N from a positive vector R(t), several steps are involved. These steps include finding the velocity vector, the magnitude of the velocity vector, the unit tangent vector T, the first derivative of the unit tangent vector with respect to time, the vector dT/ds, and curvature. Finally, N is calculated by dividing dT/ds by the curvature. Does the calculated N make sense? A correct N must be a unit vector (check its magnitude). Also, a correct N should be orthogonal to the previously calculated T (compare the slopes of these two vectors to see if they are negative reciprocals of one another).

Summary

In summary, as math teachers, we must realize that the rigors of our discipline are but one facet of our students' overall education. There are practical sides to math that need to be taught, e.g., the recognition that measurements contain a finite number of significant digits. Also, there are general and universal concerns that need to be addressed, e.g., the development of regular study habits and the honing of communication and thinking skills.

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Developing Evaluative Items for the Assessment of Faculty Performance in the Computer-Mediated Distance Learning Environment

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Background

There is a growing interest in assessing how students learn and how well they perform in technology infused courses. [1] With more opportunities for online delivery there is a need to study the impact of new technology on learners. Secondarily, we want to know more about the fear and anxiety that some student's report when presented with having to carry out course assignments online. How does this affect their performance and how do they translate this in evaluations that measure teaching effectiveness? At Kennesaw State University this research question is currently under study from a number of perspectives. This article addresses the issue of assessment from the perspective of item development. It is broken down into three brief sections in which raw items have been developed reflective of (1) how students might view their performance, (2) what fear and anxiety they may feel, and how they (3) evaluate teaching effectiveness in a technology driven classroom environment. The items presented are representative samples of a larger pool that can be found at http://www.caso.com (Reid, 1998).

Performance items:

The first measurement items below provide a theoretical foundation from which to explore the subject. [2] These were developed to determine if individuals find involvement with the online environment to be one of satisfaction and potential growth. Much of this work is based on the work of Zane Berg (1996) and (Diehl, 1989). What follows is a subset of performance-based items:

1. I feel motivated to learn how using a computer and the Internet can assist me in learning more about subjects that interest me.
2. I am the type of student who really enjoys turning in homework via e-mail and receiving a grade back from the instructor.
3. I like to work on class assignments with fellow classmates online.
4. I found that working with group members online allowed us to get assignments done much faster than if we were in a face-to-face classroom setting.
5. I made effective use of time management to get e-mail assignments turned in on time.
6. As a result of learning how to use technology in this class, I am now much better prepared for the workforce.
7. With the course syllabus placed online I was able to more effectively understand how the instructor organized the class.
8. Reflecting back on it, this course challenged me to invest time learning how to use technology that benefited my course of study.
9. It has been time well spent to learn how technology can be applied to my specific learning needs.
10. My expectations of performing well with the aid of technology in this class have been met.

Items useful in measuring student fear and anxiety in the computer-meditated environment

The second groups of items do not have a theoretical basis and were derived solely from observation as I engaged in teaching using technology:

1. I am apprehensive about using technology as a method to learn my subject.
2. My biggest fear in using a computer is not being effective in sending and receiving e-mail.
3. I have continually put off learning how to use a computer because I believe I can do as well without it.
4. I don't like the idea of being responsible for learning how to use technology.
5. I'm confused by class assignments that are posted electronically.
6. Using the Internet for research will create more problems for me than it will solve.
7. When I found out that this class was heavy on technology use, I had some serious doubts about my ability to perform well.
8. The idea of learning online and not seeing classmates for extended periods is not consistent with my style of learning.
9. I am troubled by the idea of having to learn how to use technology while at the same time learning my subject matter.
10. I came into this class expecting to be taught the subject matter, not about technology.

Faculty evaluation items

The third and final group of items helps us look closely at how we are perceived administering our courses:

1. The instructor was knowledgeable about the use of technology.
2. To help me do well learning how to use technology, the instructor provided detailed explanations in class.

3. As a result of this class my interest in the use of computer technology has grown.
4. There was real value in what the instructor taught regarding using Internet technology.
5. In-class instruction on the use of electronic technology was appropriate.
6. When necessary, the instructor took time to e-mail the class information to clarify assignments.
7. Overall, I would rate learning to use technology as useful to my future professional and workplace needs.
8. The instructor was patient with me while I learned how to use technology.
9. An e-mail list of class participants was made available to all members of the class.
10. The instructor was effective at administering the course online.

Discussion

The infusion of technology may present students with new and exciting opportunities to learn subject matter, but it can also create substantial problems for those unsure of how technology can serve as an adjunct to their individual learning needs (Downey, 1998). Ideally, technology benefits those, whose talents and abilities allow them the flexibility to use it to its fullest capacity. Anecdotal and some scholarly evidence suggest that while successful in traditional classrooms, not all students perform equally as well in electronic learning environments. Often times, students who are working and learning in virtual classrooms become overwrought with fear of isolation. They report a need to be in close interpersonal contact with the instructor. Others talk about their anxiety with the use of technology. Modem and hardware configuration problems, long waits for tech support rank high among frustrating experiences. Taken together these issues often result in evaluations remarking that while challenged, the use of technology does not serve a particularly useful purpose at the given moment.

The raw items presented are ideal for inclusion in pre-existing faculty evaluations. They can also be used to spark further item development across a wide range of disciplines and subjects. While they do not attempt to get at the richness of qualitatively derived written responses, they do present statements that should elicit feedback specific to the situational context in which they are gathered. Colleagues are encouraged to use these items to measure their students' self-perception of performance or to gain insight into the various fears and anxieties they report when using computers and technology for the first time. Ideally the results can be used to gauge what is working and pinpoint problems which interfere with teaching pedagogy and method. At the departmental level chairs may choose to assign their evaluation committee the task of redesigning current instruments. [3] Certainly at the college or university level there should be movement and discussion to address the need for accurate and flexible measurements that take into account the role technology plays

Conclusion

In presenting these items I have attempted to create a pool that can be either adopted or modified for specific subjects and needs across disciplines. Having a good understanding of how students' view the use of web-based technology in the traditional and electronic classroom is critical to developing an effective teaching strategy. How fears and reported anxieties affect on learning is also in need of investigation. The data gathered from instruments that are sensitive to technology infusion can go far in helping us become better at delivering coursework through various technological modalities. A pressing need exists to move steadily towards a revamping of present instruments, which appear to be tied to closely to "Carnegie-based" teaching models. [4] In the meantime, those who use technology in their teaching must be cautious to make sure that they are being evaluated with a set of criteria that accurately measure these efforts.

Overcoming Prospective Teachers' Beliefs Through Coursework and Collaborative Decision Making with the Professional Development Schools

Mark Warner, Assistant Professor of Middle Grades Education, Augusta State University

Educators have struggled with barriers to reform for decades. One of the most chronically persistent barriers to educational reform has been prospective teachers' beliefs about teaching, learning, and pupils. These beliefs are a product of enculturation in traditional school settings. For example, prospective teachers enter teacher preparation programs with the beliefs that teaching is transmitting knowledge by telling, learning is passive reception of knowledge, and pupils are either good students or bad students based on their ability to attend to the recitation script of traditional classroom experience. Changing prospective teachers' beliefs is a complex process involving exploration of existing flawed beliefs, confrontation of these flawed beliefs, and intervention to replace flawed beliefs with new conceptions. Over the years, some teacher educators have attempted to explore, confront, and intervene to change prospective teachers' flawed beliefs through stimulating coursework, discussion about constructivist pedagogy, and modeling best teaching practices. In spite of these good intentions, the discouraging fact is that many new teachers find themselves teaching exactly as they were taught when they went to school. Why is this so? A litany of research reveals that field experiences that do not articulate teacher education coursework often have negative effects on changing prior beliefs about teaching. Exciting, innovative theory learned in college classrooms is filtered away and viewed as an intrusion of anomalous data if it is not immediately applicable to prospective teachers' experience of "real world" teaching. Simply stated, field experiences often convince prospective teachers that schools do not want the kind of teachers their college professors want. Prospective teachers ultimately filter away their undergraduate teacher preparation coursework and resume the teaching posture of their ancestors.

Even some of the more radical, philosophical reconceptualizations professed in the new middle school movement have been powerless to effect the kind of sustained change in prospective teachers' beliefs that add up to transformational educational reform. One would think that new schools designed to accommodate such restructuring as teaming and flexible block scheduling would certainly effect change in prospective teachers' beliefs. However, new buildings, teachers working in teams, and longer blocks of instructional time are not sufficient to change prospective teachers' beliefs if curriculum, instruction, and assessment practices in schools are inconsistent with teacher preparation coursework. In fact, field experiences often confirm prospective teachers' suspicions that teacher preparation coursework is "fluff" and out of touch with the real world of the classroom.

Successful lab experiences must enable prospective teachers to experience not only continuity of theory and practice, but must enable prospective teachers to positively interact with children in dynamically structured, authentic settings. Opportunities for both summative and formative reflection and feedback must also be provided. Augusta State University's teacher development curriculum, which includes a partnership with its surrounding Professional Development Schools (PDS), has confronted the inability of teacher preparation to effect sustained change by designing education courses containing seven weeks of initial instructional time, five weeks of daily field experience, and three weeks of reflective activity. A further intervention strategy for changing prospective teachers' beliefs is to arrange course content pedagogy around the intended outcomes of field experiences. This kind of planning necessitates jointly constructing field experience activities with classroom teachers and providing coursework that supports the intended meanings of these activities. Students are then more apt to be motivated in making meaning of their coursework as it aims to prepare them for immediate performance in their labs. Most people learn on a "need to know" basis and it is the job of good educators to create the "need to know" in the minds of their students by insisting on real world applications of their understandings. Teacher educators concerned with "best practices" help themselves by making the connections between their coursework and performance in the school classroom. Furthermore, teacher educators must pursue the classroom teachers' assistance in the development of teacher preparation coursework.

The Augusta State University PDS initiative applauds the initiation of teacher owned and operated classroom field experiences. This process was initiated this fall semester at the middle grades level with the help of public school building coordinators and myself, a university consultant, who met with various teams of teachers to elicit their assistance in designing lab tasks for my students. My students are enrolled in both middle school organization and middle grades social studies content pedagogy courses. Classroom teachers who participate in the collaborative decision making of the design of lab activities are more apt to be conscious of equipping generous learning environments. Likewise, teachers empowered to share in the upbringing of prospective teachers tend to hold themselves accountable for the future of school culture by providing demonstration classrooms. I presented our initiative as an opportunity for prospective teachers to: (1) complement classroom teachers' ongoing instructional strategies, (2) provide specific assistance for their own particular class-

room needs, and (3) experience the definite articulation of conceptual framework principles presented in teacher preparation coursework that are found in everyday classroom practice.

Given the necessary planning time, the teachers working in teams consistently suggested lab activities similar to each other's as well as those I envisioned. The activities were summarily constructed to include: (1) working with children in small groups for remediation; (2) assisting with team planning of interdisciplinary units; and (3) teaching mini-lessons within the units. After receiving input from the various teams of middle school teachers, my students and I were able to co-construct the kind of coursework assignments needed to prepare them for their ensuing field experience. These students did not just talk about constructivist pedagogy, they were able to live it. Students appreciated the potential practical application of their newly acquired understandings. All coursework was needs-based and contextualized by its relationship to an anticipated lab experience. Reading assignments were not viewed as busy work or filler. Written assignments were transformed into information sharing sessions on a topics-based Internet news group. Collaboration on the planning of an interdisciplinary unit was not viewed as just another hoop with a rubric, but as an authentic experiential preparation for lab. Any information I provided either took place informally while students worked in groups planning their interdisciplinary unit or as a demonstration in direct response to student requests. The "need to know" was created and precisely exploited.

I added two other activities to allow students to reflect on their experience and have an opportunity to compare what they experienced with their understandings of "true" middle school philosophy. The first of these two activities is called the Middle School Journal. This Journal is a culminating activity intended to give prospective teachers a creative format for evaluating middle school theory and the practices found in their field experience. Prospective teachers look for instances of shared decision making, community involvement, team planning, flex scheduling, an effective advisory program, etc. The second activity is a weekly, electronic journal (listserv) used by the prospective teachers and me to discuss a wide array of problems found in the various labs placements. An additional effect of the electronic journal is the support prospective teachers give one another when imperfections in lab experiences surface. These imperfections are unable to fester into the kind of negative effects of field experiences mentioned earlier. Instead of whining and commiserating, prospective teachers encourage each other to persevere and learn from their experiences.

We are enthusiastic about the long-range results of this experience on effecting sustained change in the classroom. Students appear to be prepared to work in the various settings and classroom teachers have been empowered to assess student performance based on their ability to fulfill the goals of our conceptual framework principles. What happens when the classroom teacher shares in the ownership of teacher preparation? We are all anxious to find out. At a recent PDS meeting, team leaders reported that lab students in my courses "are prepared, involved, and clearly focused about their activities." Team teachers can give themselves a pat on the back for their willingness to participate in my students' success. Other early reports this semester are coming in via the electronic journal. One lab student wrote, "The team of teachers that I'm working with have been extremely appreciative of my help and dedication to them and their students. This is a great boost for me! I have also done a lot of research and work to help the teachers get their interdisciplinary unit ready."

Another lab student shared, "The language arts teacher uses the writing workshop method in her classroom and she makes adjustments in her lessons for kids with special needs. She teaches to multiple intelligences." Teaching in this environment is no longer viewed as the presentation of "inert" subject matter. Teaching is the contextualized managerial assistance provided by an individual or team of individuals trained in the art of implementing the best research based practices.

Augusta State University's PDS model strives to disabuse prospective teachers' antecedent flawed beliefs about teaching and learning with a more powerful strategy than the mere exploration, confrontation, and intervention found in traditional teacher preparation coursework discourse. The model articulates teacher preparation coursework with a classroom teacher-designed field experience. Prospective teachers have plenty of opportunity to reflect upon their experience through an ongoing e-mail discussion list as well as a time to debrief at the end of the semester. Furthermore, this is not just a one-semester experience. Each education course is tied to a lab that enables prospective teachers to have a continuity of experience throughout their teacher preparation program. As we listen to lab students and teachers talk about the quality of their experiences, we expect to make changes necessary to meet the needs of the school community and satisfy the ongoing demands of living constructivist pedagogy.

The Student Portfolio: A Tool for Active Learning and Success

Steven McCullagh, Associate Professor of Biology, Kennesaw State University

Kennesaw State exemplifies several trends in higher education. Growth of the student population, service to commuter students who often have family and job responsibilities, and the development of distance-learning instructional modes all provide both opportunities and challenges for KSU. One consequence of these trends is the loss of continuity and connectedness in the educational experience of many students. Instead, students may view their college experience as a set of arbitrary requirements and isolated courses, which they complete by selecting those that best fit the scheduling constraints of family and jobs. With the accumulation of credits and grades as the primary goal, intellectual growth and personal development may be left to chance and contingency rather than conscientious and guided effort. Also, many students do not experience the significant dialog with faculty that could help them match productive experiences with career goals. In fact, many students are so busy completing degree requirements that they wait until after graduation to explore their employment options or apply to graduate/professional programs. In short, some current trends in higher education make it difficult to help students take active charge of their personal and professional development and move successfully to the next stage of their careers.

The Department of Biological and Physical Sciences has addressed these challenges, through its portfolio initiative. We believe that this initiative will encourage an ongoing dialog between faculty and biology students and a shared commitment to professional development that will result in more confident and successful transitions to jobs and advanced education. The initiative's culminating event and the focus of this article is the Portfolio Course.

Portfolios are collections of the tangible products of learning, selected by the student, which represent the best products and evidence of that student's learning. Portfolios can help students define and distinguish themselves by emphasizing their best work in a way that cannot be done with the academic transcript. Portfolios have been valued in visual arts education for many years and are used in place of grades at some non-traditional colleges. Now the portfolio represents a new tool for student development among biology majors at KSU. As the primary activity of the one-credit Portfolio Course, senior biology majors gather the evidence that demonstrates their best learning, skills and accomplishments. They present their portfolios in a form appropriate for potential employers and professional/graduate schools, using appropriate formats (from hard copy to web page).

The portfolio concept emphasizes all the students' significant experiences. Students make the final selection of materials with their career goals in mind, but all accomplishments including family, military, employment, skill certifications and community service activities are potential components of the portfolio. In addition, students summarize and reflect on the meaning of their experiences, through discussion and autobiographical writing. Then they write a narrative that introduces them and shows how their accomplishments prepare them for success in the next stage of their careers. Students also prepare one or more Curriculum Vitae, in formats appropriate for careers in the sciences. The narrative and CV are included in the portfolio.

As part of the course, students utilize opportunities such as the videotaped mock-interviews offered by the Career Services Center. Many develop their presentation skills further, through on-campus interviews with potential employers. Finally, students formally present their portfolios for examination by biology faculty.

Our experience during the two terms the Portfolio Course has been offered suggests that it is effective. First, it helps students present their achievements and goals in a way that is useful to them and to others. As one student noted in the course evaluation, "My experiences and accomplishments are concrete and crystallized." Another wrote, "The PF itself is very useful, not only to show prospective employers or grad school admissions officers, but for myself." Portfolios shift the emphasis from grades to demonstrable skills and accomplishments and reinforce behaviors that produce work judged worthy of inclusion in the portfolio. Students wrote, "It provides a much-needed motivation to do an extra good job on work, so that it can be put in PF," and, "It helps direct, clarify, motivate, simplify, support, reinforce etc., my future and where I am going."

Portfolios may provide students with insights into the next steps in their development. One wrote, "Portable, life at a glance, and helps us see where we've been and where we are going and what else we need to get there." Another wrote, "As I look at it (the PF) and think about my goals, it shows me where I could augment..." Constructing the portfolio helps students see their development as a dynamic, self-directed process. Consequently, they do not think of their portfolios as finished products to put on a shelf after achieving the first job or graduate placement. Rather, the portfolio attitude reinforces the concept of life as a "work in progress." On receiving his first promotion six months after graduation, a former student wrote, "First, I wanted to let you know that I am still adding to my PF. It has been very helpful in giving me the courage to be successful in the post-college world.""

The Portfolio Course is only the culminating event of this Department's larger portfolio initiative. Our long-term goal is to encourage continuous commitment to growth throughout each undergraduate's experience. From their

first contact with the department, biology majors will be encouraged to demonstrate their growth and accomplishments by accumulating materials appropriate for a portfolio. Aware of the portfolio as a repository of work that will be useful in achieving their goals, students may be more attentive to the self-reinforcing behaviors that contribute to effective learning and to polished portfolios. The locus of control and critique of learning will shift from faculty to the student, as the student takes charge of creating his best portfolio. We believe that the portfolio's usefulness to individuals will be reinforced among biology majors, as they see their diverse experiences connected by the theme of personal development and by the document's tangible reality. We expect to see greater quality and quantity in future portfolios, once this initiative becomes part of the common culture of biology majors at KSU. In a competitive world, where tangible output is the criterion of success, we believe the portfolio initiative will connect the disparate parts of our students' educational experience in a way that encourages commitment to growth and ensures their success.

Student Learning Outside the Classroom: Transcending Artificial Boundaries

James P. Woodruff, Developmental Studies Counselor, Georgia Perimeter College

Plagued by meager budgets, limited resources, and a decrease in state and federal expenditures allocated to colleges and universities, institutions of higher learning are now faced with the grim reality of a depressed economy. To further complicate matters, at a time when colleges and universities should be focusing their efforts on preparing students to compete in the global marketplace, institutions are being watched by "people [who] want evidence that higher education makes a difference." As a result, demands for institutional accountability and positive learning outcomes for students are being scrutinized more than ever.

In ASHE-ERIC Higher Education Report No. 8, 1994, *Student Learning Outside the Classroom*, authors Kuh, Douglas, Lund, and Ramin-Gyurnek offer plausible evidence as to why colleges and universities should not despair–that is, if institutions follow the key tasks for success. For example, the authors generally recommend that institutions develop a common view of "what matters" in undergraduate education, cultivate an ethos of learning throughout the institution, and address the importance of out-of-class experiences explicitly in the institution's mission.

Wingspread Group (1993) cited in Kuh, Douglas, Lund, and Ramin-Gyurnek suggests that "colleges and universities can become more productive by making better use of existing resources so that students learn more without institutions spending more." (p. 3). To accomplish this task, the authors indicate that students' learning can be enhanced by actively engaging them in educationally purposeful activities outside the classroom.

Educationally purposeful activities as defined by the authors: "Include all activities in which students engage during undergraduate study that are either directly or indirectly related to their learning and performance and occur beyond the formal classroom, studio, or laboratory setting." (p.9).

Authors Kuh, Douglas, Lund, and Ramin-Gyurnek provide an elaborate, yet exhaustive litany of conditions based on the literature researched that characterizes ideal out-of-class environments. Such environments, state the authors, encourage students to integrate what they are learning through their out-of-class experiences with their academic studies, and vice versa. To address the importance of out-of-class experiences and the development of a common desired goal, the authors organized five clusters: (1) cognitive complexity, (2) knowledge acquisition and application, (3) humanitarianism, (4) interpersonal and intrapersonal competence, and (5) practical competence.

In the arguments of the authors emphasizing the applications of learning outside the classroom, the authors have failed to recognize the benefits of formal classroom experiences that promote higher order thinking, cooperative learning, communications skills, and active learning. Unlike the out-of-class experiences that are sometimes vague, unorthodox, and haphazard, these "teachable moments" outside the classroom are not beneficial. Structured learning environments, however, offer accommodations for different learning styles, diverse capabilities, and a greater appreciation of ethnic and cultural background in the classrooms.

In the classroom, Kuh, Douglas, Lund, and Ramin-Gyurnek admit that additional research is needed to discover the contributions of out-of-class experiences to student learning and personal development. Yet the authors provide sizeable evidence to support the need for out-of-class experiences that are certain to become a valuable asset in the future. Readers are, therefore, advised to heed the call of the authors to transcend the artificial boundaries that bind us and view the applications of learning as a "seamless web of opportunities."

Student Learning Outside the Classroom is highly recommended reading for faculty, administrators, and staff who wish to transcend artificial boundaries.

Student-Driven Microbiology Delivery**

Leigh Callan, Professor of Biology, Floyd College

Ten years ago, I was the only lecture teacher for health sciences at our two-year college. The students in a three-quarter sequence of Anatomy & Physiology (I and II) and Introductory Medical Microbiology were definitely "burned out" on me by the last portion of the third course. To jazz up the delivery of information, particularly during the Microbial Diseases proportion of the course, I offered the following extra credit option: to add as many as 20 bonus points to their test point total, a student could choose one of the following tasks:

1) Read at least three current articles from valid scientific sources (such as MMWR or ASM News) on topics of their choice related to microbiology. Turn in a written summary of these articles with reference and bibliography. Share the information with the class in an oral presentation.

2) Submit a written report from an interview/field trip with someone using applied microbiology. Possible field trips include water and sewage treatment plants or various industries (food preparation, packaging, canning, serving; textile, paper, or plastics production; recycling; health services, etc.) After the field trip/interview, search for additional information on this topic to include in the report. Present the report orally to the class. Create a minimum of three test questions on important points that the class should learn from the presentation.

3) Arrange to have someone with experience in applied/medical microbiology speak to the class. Do a preliminary interview with the speaker to gain information for your introduction of the speaker. Let the speaker know the level of knowledge the class has gained through previous study, and anticipate questions and points of interest that the class may have about the topic. Have the speaker sign a video release that allows the college to tape the presentation for future use. Turn in a written summary, including test questions that cover the material presented.

Students were instructed to choose a topic that interested them and that they could relate to class information. Some related their work experiences; others chose medical situations in their families. The points earned were assessed according to the students' understanding of their topic, the adequacy of resource material and documentation of these resources, the application of the topic to the course content, the overall quality of the report, and the submission of test questions. Topics were submitted by the time of the first test (1/3 through the course) which allowed me a chance to approve the topics. Completed papers were due 2/3 through the course. The presentations then could be worked into the lecture class schedule (for the last 1/3) in an appropriate grouping of topics. I would be prepared to "chime in" with additional information that I would have included in the lecture myself.

Both the students and I were surprised and excited about the immediate success of this approach to learning. The students seemed much more focused and interested in what their classmates had to say than in a typical straight lecture. I ended up learning a lot myself. We were all amazed at the variety of experiences our students have had in their personal lives and in their work places. Suddenly, the subject material became more real to everyone. Yes, some areas were emphasized more than others, and a few areas never were discussed at all. I had to be on my toes, following the discussion and guiding it – trying to keep mental notes of where the upcoming test emphasis should be. The value of student participation, connection with "the real world,", and using experiential learning vastly outweighed the loss of complete control over the subject matter sequence and content coverage. I'm convinced that this method gave them as much or more knowledge as the previous lecture style. With their submissions of test questions, the evaluation focus remained fair with respect to content covered and emphasized.

Since students are moved to action by "Extra Credit,", participation in this activity remains high. Leaving it as an optional task keeps the already overloaded student from feeling burdened with "busy work". In some cases the student whose grades are high will put great effort into this task, yet the student who needs it most may not even try. It has been very fulfilling to see the student who is very timid about the oral component become encouraged by support from other students. Many of these students actually end up with the best presentations. I immensely enjoy the relieved, proud, and satisfied look on their faces. This is one time I can visibly see my students grow in confidence and maturity.

An additional benefit to the third option (that of bringing in a guest speaker) is that we gained valuable community contacts for future interaction, and were left with a set of videotapes that we could work in as needed, or assign to students as reference material in subsequent classes. We have since dropped that component, since we don't want to overuse the resource persons. It can be re-instituted periodically in order to update the videotape section.

Currently there are three teachers in the health sciences, and we have all adapted this same approach. The Student Records section of microbiology classes has become an event that we all look forward to, and we invite each other's students to attend the presentations. With the recent Information Technology Project instituted at our campus, each student leases a powerful laptop computer with Internet capability, word processing and presentation software. This has opened an entire new vista for these reports. My most recent microbiology students were able

to use Internet sources for cutting-edge information on their chosen topics, and many of them chose to create Internet sources. Students presenting a report e-mail their three questions to me, which I then forward to the whole class to create a test bank. I chose a number of the most appropriate questions to include on their last test. Many of these were the same questions that I would have asked in the typical lecture-delivered setting.

Just to list a few examples here are some special connections that were revealed by the Student Report option in the most recent class:

One Student had been treated for leukemia in Houston back in the 70's, and her room was next to David (Boy in the Bubble). She remembers playing checkers with him by using the "arms" connected to his bubble.

Another student was a scrub nurse for orthopedics in a local hospital. He was involved with setting up and controlling the field in the state's only UV operating room for total joint replacements.

A student's mother was one of the experimental patients in the testing of penicillin in the early 1940's.

Without the "Report" vehicle, we wouldn't have been able to share these and many other fascinating and significant experiences.

**This article first appeared in *Focus on Microbiology Education*. Reprinted by permission.

So, you want to go on an international teaching assignment...

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You might want to go on an international teaching assignment. I did. So, when an opportunity in Germany opened for me during 1998, I took it. Before leaving, I did not know what to expect. When the experience crystallized in my mind, it was better and more brilliant than my uncertain and cloudy expectations. Although my experience turned out very well, I believe that was mostly luck. It might have been otherwise.

Preparation is key to a successful international assignment. My goals are to share my observations, describe my experiences and offer some recommendations about teaching. My purpose is to aid colleagues in preparing to teach in another country. I include recommendations for personal, professional, and pedagogical preparation.

Introduction and Background

Since I was graduated from Macalester College in the '70s, I have wanted to go on an international assignment. Macalester, which has produced a Vice President of the United States and a Secretary General of the United Nations, has always had a deep international presence. During an undergraduate growth experience, Macalester fostered a personal desire to work abroad someday. This desire burned within me for many years before it was fulfilled.

Being practical I delayed my international gratification and entered graduate school at Michigan. IBM hired me a few years after my degree completion. That my employer's first name was International was not lost on me. An international assignment was the top goal on every development plan. Although never achieving an international assignment at IBM, I got better at justifying and planning one with every renewal of my development plan.

Recommendation: Look for a "fire within you."

To teach abroad, one needs to have a fire inside. There are many situations that you will encounter requiring you take actions on your own initiative and energy. You must be motivated to adapt quickly. Do some self-reflection. If you do not find a fire inside, reconsider an international assignment.

Recommendation: Justify and plan your international assignment

Your international assignment will require much time and effort from you and others. To focus that, you need a plan. As you plan, it helps to justify the effort to yourself and others. If you have family, do not forget them in this step. Plan the assignment from preparation to re-entry. Review your plan with all interested parties for buy-in.

My Assignment and My Goals

During May and early July, 1998, I was Guest Professor of Wirtschaft Infomatik (roughly translated, Business Information Technology) at the Fachhochschule Anhalt (FHA) in Bernburg, Germany. I was the second professor from Southern Polytechnic to hold an FHA Guest Professorship. Sid Davis held the position earlier. I taught a seminar on computing and information technology for international business. These topics included international distance learning, teamwork, electronic commerce, knowledge mining, web development, etc. My students were in the International Business Program. Almost all of them spoke English. I delivered four lectures a week, and provided an exam at the end of the term.

Based on some early conversations with Sid, I decided to set some goals in collaboration with my sponsors at FHA and Southern Polytechnic. These goals turned out to be necessary and positive. When I faced one of the many decision-making situations on the assignment, they provided quick and sure guidance. My goals were:

- Promote cultural exchange.
- Teach special topic seminars covering computing for international business.

- Assist the development of an International MBA program.
- Meet with education and business professionals to discuss and promote collaboration and exchange.

Recommendation: Find a good colleague here.
Sid Davis was an invaluable colleague and resource. Through our discussions I was much better prepared for the experience and also to do a good job. Having an interested colleague for conversation and brainstorming was very positive and beneficial. I therefore recommend finding a good colleague who shares your international interest.

Recommendation: Set goals and implement them.
To paraphrase an advertisement slogan, "Do not leave on an international assignment without goals." They help you communicate with your hosts and yourself as they make difficult decisions easier.

The Campus the Language the Life and the Work
Bernburg has about 40,000 inhabitants and is located in Saxon-Anhalt about half way between Berlin and Dresden. It is in the heart of the former East Germany. During World War II the campus was an airbase. During the cold war it headquartered a Soviet Garrison. For the fifty years prior to German reunification (in 1990), the campus site did not have many visitors from the U.S. Now it is a pleasant college campus community in a rural almost pastoral setting, where guests from around the world are welcome. My family (wife and two daughters) joined me for the last two weeks of the assignment. We all enjoyed walking around and touring the area.

I spoke some German and was understood. I could not understand 95% of the German spoken by the natives of the area. Up until reunification, the predominant foreign language spoken in the area was Russian. During my stay fewer than thirty of the hundreds of people I met spoke English. I met only three other Americans serendipitously, one traveling to Poland, and two in Dresden. It was nice to be understood and most people appreciated my efforts at German. At times it felt isolating not to understand simple conversations around me, but these times were few.

My German allowed me to participate in life. This life was comparable to small-city campus life in the U.S. There was a construction boom and many new cars in the area. Travel often was congested as in Atlanta. During the week, work is done at a frenetic pace. Weekends are slower and most businesses actually close for a rest. Leisure is often outdoors, but less often an organized sport. Bicycling, hiking, canoeing, and sitting are the predominate activities. I spent many pleasant hours and meals in a garden, backyard, or outside restaurant. I stayed mostly in the eastern part of Germany–an area rich in history and culture. Favorite spots included Bernberg, Dessau, Dresden, Halle, Leipsig, Merseburg, and Wernigerode.

Recommendation: Learn the language.
The person was right who said, "If you try to speak the language when you are in a foreign country, the residents will appreciate the effort." You will have a more fulfilling time.

Recommendation: Learn about and tour the area of your assignment.
Unless there are security or safety issues, I suggest touring and getting to know the area of your assignment. It is one of the best ways to learn and receive a good picture of the culture. For example, it was valuable to see many of the cultural centers of Germany as they emerge from the cold war. My hosts and travel guides such as Baedeker's and Fodor's were great resources. I am confident I saw everything I wanted and much more.

Teaching and Learning—Faculty and Students
I also participated in the life of the faculty. Both "Ossies" and "Wessies" (respectively, people who grew up in the former East and West Germany) were faculty members. I quickly discovered that reunification had brought many issues. For example, Ossies and Wessies are compensated at different rates. When I first arrived I wondered how to react to these issues. In short time, my German colleagues showed me what to do: act as a good faculty colleague to other faculty. Don't try the impossible, instead do what is possible.

The German education system is different than the American system. After application, faculty and students are assigned to a school. Students attend lectures (optional) and take exams. The only requirement for receiving a degree is passing all exams. The students do not register for courses. Tuition is non-existent. Room and board and fees are very reasonable. Since each curriculum is set and completed with little variation, students know what courses they need to take. Since success rests on passing the exams, attendance in class is greatly variable. Fachhochschule students complete a practicum semester, where they might intern in industry.

Initially, the haphazard class attendance surprised me. After I realized they did not pay tuition and attended class (or didn't) based on juggling many priorities, I discovered a strategy to share how other cultures view priorities. Having the IBM experience, I was able to provide some glimpses into workday requirements. For many students this was eye opening.

Recommendation: Be a good faculty colleague and a good professor/ambassador.
After about the first week, I adopted a decision rule for my interaction with hosting faculty: Will this action make me a good colleague to all the people in this situation? I applied it once or twice each day, and it led to success. Since most of my students were in the International Business Program, they would likely end up in a multi-national firm. I shared some examples from my IBM experience.

It's One World, but Your Assignment is in a Different Culture

In the 1970's at Macalester I was enthusiastic about the prospects for world citizenship. I had not thought about this very much in the intervening years (it was not required), but I had a vague recall of it on the trip to Germany. On my second day there I discovered how naïve was the concept of a world citizenry. On this day I first interpreted the political posters from the elections in the state of Saxon-Anhalt. Many had similar slogans as those used in the U.S. against the NAFTA treaty a few years earlier. On this day I changed my ideas about a world citizenry—that ideal is not viable. In Germany, I conceived of our developing two "personalities" or "personas." One is the personality or persona of our native homeland. The other is a second "face" that we put forward in the international arena. Our international face is shaped by our native personality. It is also shaped by the diversity that we as the primary inhabitants of this planet need for survival.

Recommendation: Use your assignment to develop an "international personality."

I suggest an international personality will make your international assignment more fulfilling. Maintain your cultural base, and also adopt an additional personality oriented towards internationalism and commonality. This brought me closer to my hosts and they often reciprocated. You will probably find as did I that your international assignment will be doubly good when experienced through your national and international personalities.

Summary

These are my observations on teaching and learning from a recent international assignment. I taught well but learned much more. Good motivation and preparation, a collegial attitude, and an international perspective and personality are all keys to successfully teaching and learning abroad.

From Kennesaw to Buenos Aires and Back

Nina Morgan, Assistant Professor of English; Kathleen Smith, Assistant Professor of Nursing; Army Lester, Professor of Biology
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As progressive universities worldwide struggle to remake themselves in the face of the traditional stereotype of elite, ivory tower retreats, their success can often be measured in the degree to which the new academy is able to make a substantial impact on real world concerns and participate directly to alleviate social problems and influence social practice. Service to the community has become as important as the more abstract contribution that a university makes to expanding knowledge. Clearly the best programs do both.

Examples of change may be found in the Welfare to Work (WTW) program in which Kennesaw State University's (KSU) Continuing Education department participates, and in projects such as the health exams KSU's nursing students assist faculty in performing at Atlanta area health fairs. This evolutionary change signals a new function for the American university as it works to harness its considerable intellectual and human resources for the benefit of the broader community of which it must be seen as an intrinsic part. It should not be surprising, perhaps, that there is a striking parallel in the changes occurring in universities in Argentina.

During a summer 1998 Faculty Development Seminar to Buenos Airs, Argentina, members of the KSU Faculty learned about two service oriented programs in which Argentine universities are involved and which mirror our concerns and interest in serving the community. University education at public institutions in Argentina is free. In fact, it may surprise some Americans to learn that Argentine universities have extremely high student populations: Universidad de Buenos Aires (UBA), for example, has a student body of approximately 200,000. However, the extreme poverty in some sectors of the population works against the development and success of long-term educational goals for many young people. In response to the large gap between the formally educated (whose job opportunities and social position are both strong factors in their economic viability), and the generally uneducated, the Ministry of Labor in Buenos Aires initiated in 1994 a program through which universities and other organizations might provide basic skills training for an identified sector of the community. Working in collaboration with those offering training courses, companies and businesses agreed to hire the participants in an arrangement not unlike that of our Welfare to Work program (1997).

While in Buenos Aires, three KSU faculty were invited to visit with the Minister of Labor, Erman Gonzalez, to discuss the role Argentine universities are playing in the Ministry's project of integrating 280,000 individuals into its service learning system by the millennium called "Proyecto Joven," or "Project Youth." The program constitutes a social and educational challenge requiring both financial and intellectual resources. Participants are paid a weekly wage while enrolled in the courses of their choice;

all educational materials are supplied; and they are even provided with meals and compensated for childcare expenses while in the program. The commitment extends beyond Buenos Aires to communities throughout Argentina and brings together some of society's most disparate members: its educated elite and economically advantaged, and its dispossessed classes.

Representing the Argentine University system were the Dean of the Faculty of Science and Technology of our host university, Universidad del Salvador, Dr. Miguel Guerrero, and two teachers who had participated in the program, Mirta Pietragallio and Edith Barreiro. Guerrero described how the program has integrated the university into the formation of the work force, establishing a strong link between the economic and educational structures of society which, although they have always be allied, now work more effectively to meet the needs of those who have traditionally not been involved in their systems. These are the undereducated youth, who, in an age of rapidly developing technology, see their opportunities to enter the labor market diminishing more quickly than ever.

To prevent the growth of an emerging class of individuals who have no access to either continuing education or to dependable employment, Proyecto Joven has designed a win-win situation in which universities and other institutions of education create and implement courses to prepare the participants for internships in the marketplace. Of course, the initiative has not been without its particular challenges. For example, it has often been difficult for project managers to ascertain that all participants meet the program's initial criteria; additionally, grounds for exclusion from specific courses were frequently so ill defined that clearly unsuitable participants could not be effectively dissuaded from joining courses in which they could not possibly succeed, or in which their physical disabilities precluded their chances of gainful employment. An extreme examples was the case of a man with one leg who entered a training course for hospital orderlies who were required to lift and carry immobile patients. He could not be turned away due to the lack of any mechanism for doing so.

Classes were generally held daily for six to twelve weeks, and were followed by internships scheduled for eight weeks. However, many participants move directly into full time employment. According to Piertragallio and Barreiro, the universities faced unanticipated challenges in preparing often radically nontraditional students to meet the needs of companies involved. The eligibility profile for the program indicated that participants should be over sixteen years of age, unemployed, have no more than high school education, be living at the poverty level, and lack any special labor skills. For the first phase of the project, 89,000 (of the estimated 100,000) individuals took part in any one of approximately 6,000 courses offered. A large majority of these students needed not only a review of such basic skills such as answering telephones properly but also general instructions in personal hygiene and social etiquette. Although this was not part of the project's initial plans, this increased participants' chances of getting and keeping jobs.

Statistics show that from the participating companies' point of view, 84% believed that the students were able to "acquire work habits of discipline, punctuality and personal presentation." Furthermore, 87% held that the interns were able to integrate themselves into the company. In tracking early participants, project managers found that after one year, 71% of the men held jobs (whereas 18% had done so previously), and 52% of women were employed, while only 11% had ever held a job before entering the program.

Proyecto Joven, is a nationwide program, much like the United States Governments' Welfare to Work porgram, in which a university or other educational organization participates, but its regularly enrolled students are not generally involved. However, Argentine University students are also involved in localized service learning projects much like those at KSU. At the Universidad del Salvador, for example, the university has a contract with a company that provides the government with statistical data. As a part of their training, a group of computer science students have joined together to form a subsidiary company that gathers and analyzes statistical data. They are currently working on the Year 2000 Census for the city of Buenos Aires. Giving the students the opportunity to apply the computer skills that they are developing in their university careers and supplying them with the tools and technology to put into practice some computer service for the city government means that students can both learn and earn. While students at the Universidad del Salvador do get paid for their work on this project, computer science students at KSU do not receive compensation for the service projects in which they are involved, either with for-profit or not-for-profit companies. They do, however, earn course credit. Likewise, service learning projects in which KSU nursing students participate provide those students with valuable clinical experience as well as credit hours. However, their participation in service projects—from implementing an abstinence based pregnancy prevention program for adolescent/disadvantage individuals through Girl, Inc, to working in the indigent health care clinic for the undeserved at Cobb Health Partners—is not compensated monetarily.

Clearly both American and Argentine universities, have moved out of the ivory tower and into the city itself. By providing training to teachers and managers of social welfare programs such as Welfare to Work's Project IDEAS and Proyecto Joven, by offering courses in practical employment skill, by monitoring programs through workshops and conferences, and by serving the community in education, in social development and in economic advancement, the university has broadened its purpose of reaching through teaching.

Oral Exams: An Alternative Evaluation Method***

Annette Bairan, Professor of Nursing and Beverly Farnsworth, Professor of Nursing of Kennesaw State University

Faculty are always seeking better ways to evaluate student learning. Oral examinations can be a viable assessment strategy when multiple assessment techniques are used – for example, a paper, an essay exam and an oral exam. "When carefully planned, administered, and evaluated, oral achievement test are fairly reliable assessments of abilities and skills, many of which are inadequately measured by written objective or essay examinations." [1]

One of the authors administered oral exams twice a year to students enrolled in Sociology of Health, covering a three-years-period. The course syllabus explained the process as follows: the mid-quarter exam will consist of a 30-minute individual oral exam in which you will be asked ten questions concerning course content. The session will be recorded (with your permission) for review prior to assigning a grade based on adequacy and appropriateness of answers. Questions will be more open-ended than specific, and there will be a time limit on each question to ensure the exam can be completed within 30 minutes.

The instructor delineated key points for successful responses, gave an example question and answer, and named two of the ten concepts that would be tested to assuage some of the anxiety associated with a new and untested method of evaluation.

To prepare for the exam, the instructor posted a large "Do Not Disturb-Testing In Progress" sign on her office door, forwarded the phone to the secretary, arranged a comfortable chair for the student, and placed the tape recorder in the periphery. After the instructor greeted the student, she requested that the student sign a form granting permission to tape record the evaluation and promised test confidentially to the student.

The exam began with the first two expected questions. An example is, "Relate age, gender, ethnicity, and social class to health using life expectancy, morbidity, mortality, and health services utilization rates." Answers did not have to include specific statistics, but they had to include the relationship of gender, children, adults, and older adults; African-Americans, Asian-American, Native American and Latinos; and upper, middle, and lower socioeconomic classes to the concepts of life expectancy, morbidity, mortality, and health service use rates. For example, in general, women in the United States have longer life expectancies than men, higher levels of morbidity but lover levels of mortality, and higher use of health services, even when maternity services are excluded from analysis. To grade the students, the instructor reviewed the audiotapes and compared the answers to the criteria for adequacy and appropriateness of responses.

Student evaluations of the oral exam were very positive! Although not statistically significant, the means of the oral exams exceeded those of the written final exams for every class. The only negative responses were anxiety and nervousness before the exam. The instructor gained a better understanding of where the students were in relation to comprehending the course concepts. Nevertheless, the administration of the exam was exhausting when more than six students were scheduled sequentially.

In conclusion, the authors recommend oral exams as an alternative evaluation method of student learning. Oral exams offer another viable perspective on students' understanding of material, and when used with other more traditional assessment techniques such as papers and written exams, oral exams add a significant dimension to the evaluation process.

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The Secret Thoughts of Teachers

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What kinds of thoughts about a lesson go through a teacher's head as he or she teaches? There is constant decision-making based on students' input. Numerous adjustments are made to the lesson with regard to pacing, questioning, and general lesson management. Do all of these thoughts need to be kept secret from the students? More and more teachers are practicing inquiry teaching in the classroom. Because these methods may be vastly different from those which students have previously experienced, teachers might have to deal with frustration – from themselves and from their students – provoked by the seemingly unstructured nature of the learning opportunity. Comments from students such as, "She's not teaching us anything," or "We're not learning anything or doing anything," are not unusual. But the teacher knows better. The teacher has inside information. The teacher watches his students practice their higher order thinking skills while they interact with the content. He knows that they are learning important skills that will benefit them in the future. But do the students know? As educators, we are aware of how important it is to "close up" a lesson, to help the students realize that they did actually learn something in class today. The "something" that students learn includes more than just content. So shouldn't they also be made aware of the thinking they had to do while they learned the content?

During an inquiry lesson, the teacher presents a discrepant event, puzzling situation, or intriguing information to the students. Then he or she asks open-ended questions to help students observe, infer, hypothesize, and draw conclusions with reference to the content. The degree to which a teacher offers guidance varies with the degree of independence on the part of the learner. Whereas it might seem that students are being left on their own to find, collect, and analyze information, the teacher is really acting as a facilitator, guiding the students as they use their thinking skills to construct their own knowledge. The role of the teacher and student are very different than those demonstrated in a traditionally oriented classroom.

As a teacher educator, I am responsible for teaching future teachers how to teach. Others at my institution teach content to future teachers. We all must be effective models of instruction. Because of this, I use inquiry lessons as much as possible. I even use an inquiry lesson to teach students how to use inquiry methods. I pick a concept and teach it using inquiry methods and then again using traditional lecture and note taking. Then, I ask students to compare the two lessons with regard to teacher behavior, student involvement, ownership of knowledge, kinds of questions asked, and other factors. A list of student responses become a list of the characteristics of inquiry vs. traditional lesson methodologies. Upon completion of this lesson on lessons, students' eyes widen with the realization that they have used higher order thinking skills to construct concepts important to the learning. It seems that after this, they are really "turned on" to inquiry methods. The next time I begin a lesson, they are aware that the objectives for the lesson include practicing thinking skills. And, as stated before, we have that an awareness of the objectives promotes the achievement of the objectives. They participate with great enthusiasm and activity.

Soon, my students/future teachers will make their way into their own classrooms. It is hoped that they will incorporate the inquiry methods they learned of as students of teacher education. Why not share the secrets they know? I did when I was teaching them about inquiry methods. Teachers sometimes take the first few minutes of class to teach students group communication skills. Why not teach students how to participate in an inquiry lesson? Pick a concept and teach it first using inquiry methods and then using more traditional methods. Ask students to compare the two so that they become aware of the learning and thinking that is happening as each lesson progresses.

By letting students in on the secret thoughts of teachers, there is the likelihood of increasing their active participation and reducing the frustration that results from the perception of the lesson's having no structure. Sharing objectives, purposes, procedures and motivations for the use of inquiry methods should be considered by all who teach.

Bubbles in the Classroom

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Every time I challenge students to think with movement and without words, the first reactions include the familiar blank stares and confused faces. In teaching physical fitness and wellness components, it is often too easy to spend most class time looking at facts and figures that reflect the success or failure of particular lifestyle behaviors. Students often forget that the theories and principles are just results of actually participating in movement activities and experiencing environmental interruptions. A health and fitness class that encourages movement and participation in lifelong activities by providing opportunities to experience them allows me to monitor my students' personal understanding of principles and their application. Experiential education, usually associated with outdoor education environments, additionally allows me to utilize activities that do not require an adherence to rigid structures which call for specific duration, frequencies, and intensities to acquire health-related benefits. More importantly, it demonstrates that an individual's concrete experience of an activity can be beneficial both on a personal and community level, since, as Kolb suggests, concrete experience and active experimentation is usually associated with an open-minded approach to life plus an ability to accomplish tasks (Kolb, 1996). Further, it allows creativity and spontaneity to be as large a part of health and fitness as is target heart ranges and proper nutrition.

Ashley Montagu states that "play is one of the most valuable traits of the human species," and that "play has led to the enormous broadening of perceptual horizons, new discoveries, further exploration, and mastery over the environment" (Montagu, 1989). In a time when social and instructional interactions can become isolating and depersonalized activities because of the increased use of computer technology, experiential education games and initiatives provide a complement that builds a community within the classroom.

One game I have used successfully in classroom settings involves the use of simple bubble-making toys. By having teams produce a variety of bubbles (longest-lasting, smallest, largest, multiple or most) in a variety of situations (standing, sitting, moving) it facilitates an understanding of breath control during movement, teamwork, communication and cooperation. Using such active games, students not only see the physiological effects from physical movement, but are also introduced to the principles of teamwork, compromise and sharing to obtain both personal and group goals. Initiatives, which build on the foundations laid by various games, are complex activities that build trust and problem-solving skills not only for the activity at hand, but for similar situations which would benefit from a similar approach. This first-hand experience changes the abstraction of ideas into practical applicable approaches useful not only for the classroom, but for life as well, if "one has to have experiences before they can be shared" (Reed, 1996).

Another benefit of using experiential methods allows students to view their instructor as a facilitator, whose role is not just to provide answers and dispense knowledge, but to help in the process of dynamic learning and facilitate the natural learning taking place for each individual student.

This allows me to gain measures of trust from the students by exemplifying mutual trust and respect during the activity. As an facilitator I am forced to assume a greater variety of roles than is usually exhibited in the classroom alone, and within the context of an experiential activity a student becomes an active participant in the learning process.

There is a central them inherent in one component of experiential education called "Challenge by Choice." This idea has two main principles which guide the participant in all types of activities: First, trying something is more important than succeeding or failing; Second, each individual decides personal limitations of what can be accomplished, but then attempts to extend the limitations. There are several benefits to this approach. It allows a student to take on challenges that are potentially difficult and intimidating with support and encouragement from their peers. A student has a chance to withdraw from a situation when confidence is lacking or the pressure to perform is great, while maintaining the opportunity to try again. A student has an opportunity to try difficult challenges with the recognition that the attempt is more significant than the outcome (Rohnke, 1991). The inherent idea from this approach is the realization on the student's part that risk-taking and pushing set limits can result in success and even unexpected gains.Certainly not all topics will be easily incorporated as experiential activities. However, activities can take other forms, such as peer instruction, peer challenge, and group-oriented problem solving tasks where students are challenged to take risks in an atmosphere of support and understanding. While incorporating such activities in a classroom reduces time spent on content, the increase in productive group dynamics can improve individual achievement, classroom productivity and raise the quality of work. By breaking down the classroom structure into comfortable environments, students are encouraged to take risks in what they perceive as non-academic situations, which can lead to increased self-confidence and further risk-taking in all situations, including participation in traditional classroom studies.

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Notes:

[1] In this article I interchangeably use words such as the "Internet," "online," "infused technology," "electronic classroom" to mean one in the same thing.

[2] The items presented have not be subjected to any particular statistical analysis. There is a need to verify internal consistency. No testing has been conducted to verify that these items will accurately measure what they purport to measure. Some of the wording may also cross over into other related constructs and as such may be sensitive to other phenomena.

[3] From the perspective of measurement it is suggested that these items be presented in a categorical format. "Yes" and "No" questions are quite absolute, and leave little room for variability that might be experienced in Likert scale presentations.

[4] I wish to argue that many instruments used to evaluate "Carnegie type" performance are biased. They do not measure specific aspects of teaching effectiveness that are likely to be enjoyed by faculty members who use technology to teach with either in synchronous and asynchronous environments

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